National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1082

Cigarette Ignition Strength Standard

This Standard Reference Material (SRM) is intended for use by test laboratories to assess and control their testing of cigarette ignition strength in accordance with ASTM Standard Methods E 2187-04 (or ASTM E2187-02b). The SRM unit consists of one carton of cigarettes containing 10 packs of 20 cigarettes each.

Certified Values and Uncertainties: A NIST certified value is a value for which NIST has the highest confidence in its accuracy and that all known or suspected sources of bias have been investigated or accounted for by NIST. The certified value for ignition strength is given in Table 1. The certified value is the result of testing at NIST, Kidde-Fenwal, and the National Research Council, Canada. The certified value and its uncertainty were obtained by fitting a Bayesian hierarchical model [1] to the data from the two laboratories. The model accounts for random variation both within and between laboratories. The data from each laboratory was modeled using individual binomial likelihood functions, the between-laboratory variation was modeled using a beta distribution, and non-informative prior distributions were used for all parameters in the model. The model was fit to the data using Markov chain Monte Carlo methods. The expanded uncertainty given in Table 1 is reported at the 95 % probability level. This uncertainty includes measurement variability within and between laboratories. Tests for cigarette uniformity did not show evidence of any significant variation in ignition strength between packs. A combined standard uncertainty for the certified ignition strength of $u_c = 1.65$ % should be used in further uncertainty calculations.

Table l. Certified Values

Measurand	ASTM Method	Certified Value and Expanded Uncertainty
Ignition Strength (on 10 layers of filter paper)	E 2187-04[(a)]	12.6 % ± 3.3 %

[(a)] Standard Test Method for Measuring the Ignition Strength of Cigarettes.

NOTICE AND WARNING TO USERS: THERE ARE SUBSTANTIAL SAFETY HAZARDS ASSOCIATED WITH EXPOSURE TO BOTH PRIMARY AND SECOND-HAND SMOKE FROM CIGARETTES. THESE CIGARETTES ARE ONLY TO BE USED UNDER THE LABORATORY CONDITIONS DESCRIBED IN ASTM E2187-04.

Expiration of Certification: The certification of SRM 1082 is valid, within the measurement uncertainties specified, until **31 December 2015,** provided the SRM is handled in accordance with the instructions given in this certificate (see "Instructions for Use"). This certification is nullified if the SRM is contaminated, disfigured, or otherwise modified.

Maintenance of Certification: NIST will monitor representative samples from this SRM lot over the period of its certification. If substantive changes occur that affect the certification before the expiration date, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

The coordination of the technical measurements leading to certification was performed by R.G. Gann of the NIST Fire Research Division.

Ignition strength measurements at NIST were made by J. Lee of the Fire Research Division.

Statistical consultation on experiment design and analysis of the certification data were performed by W.F. Guthrie of the NIST Statistical Engineering Division.

William L. Grosshandler, Chief
Fire Research Division

Gaithersburg, MD 20899
Certificate Issue Date: 01 February 2006

Robert L. Watters, Jr., Chief
Measurement Services Division

The support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

The cigarettes were purchased by NIST from Philip Morris USA (Richmond, VA).[1]

INSTRUCTIONS FOR USE

Stability and Use: ASTM E2187-04 states that cigarette test specimens are to be protected from physical or environmental damage while in handling and storage. It is important that the specimens not be crushed or deformed in any manner. Careful handling is needed to ensure that the specimens are not contaminated while in storage, and that they are protected from degradation by insects. If test cigarettes are not to be used for more than one week, they are to be stored in a freezer at approximately 0 °C (32 °F).

Prior to testing, the cigarettes are to be removed from the pack(s) and conditioned at a relative humidity of 55 % ± 5 % and a temperature of 23 °C ± 3 °C (73 °F ± 5 °F) for at least 24 h. The cigarettes are to be placed in a clean, open container, with the number of cigarettes being sufficiently small to enable free air access to the specimens, for example, a maximum of 20 cigarettes in a 250 mL polyethylene or glass beaker.

Material Selection and Packaging: The state of New York, the state of Vermont, the state of California, and the dominion of Canada have enacted legislation requiring that all cigarettes sold in their jurisdictions must not exceed 25 % full-length burns using this test method. A test consists of 40 determinations, each on a substrate consisting of 10 layers of filter paper. The filter paper is to meet the weight requirements in ASTM E2187-04 and is to be conditioned prior to testing, as described in the ASTM standard.

This SRM was developed because cigarette companies, the New York Office of Fire Prevention and Control, and Health Canada indicated a need for a standard cigarette that could be used by testing laboratories and manufacturers to assess and control ignition strength testing to assure regulatory compliance and quality control. The planned cigarette was to have a target ignition strength near (a) the required pass/fail criterion and (b) the value to which cigarette companies would need to design products in order to assure success during compliance testing, which is somewhat lower than the pass/fail criterion.

After examining several prototypes, Philip Morris USA submitted the candidate standard cigarettes to NIST. The packs and cartons were printed to NIST specifications at the factory. The cigarettes themselves bear no markings.

REFERENCE

[1] Gelman, A.; Carlin, J.B.; Stern, H.S.; Rubin, D.B.; *Bayesian Data Analysis*; Chapman and Hall: London (1995).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program at: telephone (301) 975-6776; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet http://www.nist.gov/srm.

[1]Certain commercial equipment, instrumentation, or materials are identified in this certificate to specify adequately the experimental procedure. Such identification does not imply recommendation or endorsement by the NIST, nor does it imply that the materials or equipment identified are necessarily the best available for the purpose.